

destructive action of an earthquake. For example, we find that in some cases well-built and substantial churches and houses suffered severely, while crazy erections, considered to be almost on the point of falling to pieces, received little or no disturbance. This apparent paradox is of course explained by the fact that the sudden backward and forward motions of the ground on which a building stands, although they may be, and in general are, of limited extent, bring very severe stresses to bear on high masses of masonry, which although it may be of the very best construction has little strength to resist the strains produced; while more loosely put together, and, in ordinary circumstances, insecure structures are capable of yielding to the necessary extent and escape unharmed. Again, when an earthquake consists of approximately periodic movements of the ground, buildings or parts of buildings, whose natural period of free oscillation coincides with, or is some multiple of the period of the disturbance, yielding to the repeated and conspiring impulses, oscillate with increasing range, until return to the equilibrium position is no longer possible and they collapse in ruins.

A phenomenon observed in connection with many other earthquakes, the rotation of upright pillars such as gravestones and monuments, on their bases, was very remarkable in this. Herr von Prudnik does not accept the explanation which has been offered by Mallet and others that the rotation is due to vortical movements of the earth's surface; and he offers an explanation which, though not quite clearly put dynamically, seems to point to the true theory. The cause of the phenomenon no doubt is that the first sufficiently severe shock causes the body to tilt over in the direction from which the shock proceeded, and immediately after, the shock, although rectilinear in direction, makes the body turn round on the corner or portion of an edge on which it for the moment rests. This explanation has been tested with model gravestones and obelisks placed on a table, which could be shaken so as to imitate the motions of the ground during an earthquake, and found to answer perfectly.¹ The circumstance that in the earthquake at Agram, as elsewhere, the gravestones at one particular place were for the most part rotated in one direction accords well with this explanation, as no doubt the gravestones there were all set so as to face in one direction.

Herr von Prudnik is not of opinion that the earthquake was due to volcanic agency, but thinks that it was produced by the yielding to mutual stresses of the materials underlying the Slamen mountain, which lies along the middle of the area in which the destructive effects were most marked. This mountain occupies an area roughly elliptical in shape, about 4.5 kilometres (6 Meilen) long by 3 kilometres broad, and is composed for the most part of slate, limestone, and dolomite surrounded with strata consisting mainly of marl. To this mountain all the effects point as the locality in which the earthquake originated; but here again we think the use of self-registering seismographs would be of great service in giving definite information. This would also give most valuable information as to the velocities of propagation of earthquake motions in strata of different materials. In the present case the disturbance travelled from Agram to Vienna in twelve seconds, which gives a velocity of propagation of 2.2 kilometres per second. It is not stated, however, how the exact times were observed.

Among the details of the many interesting phenomena, we find a very careful account of an outbreak of "mud volcanoes" at Reznik, a place about 8 kilometres west-south-west of Agram; but for details as to this and many other important points, we can only refer our readers who are interested in seismology to the memoir, which will well repay perusal.

¹ Vide Milne and Gray on "Earthquake Observations and Experiments," *Phil. Mag.*, November 1881.

NOTES

WE are enabled to give the text of the telegram received in Stockholm this week from the Swedish circumpolar observation party, which has wintered at Spitzbergen. The news is the first received from the expedition since October last:—"Cape Thordsen, July 4th, 1883. This message will be forwarded tomorrow to Capt. Startschin with the boat fetching our first mail this year. The wintering of the expedition has in every respect been attended with success, particularly as the scientific researches have throughout been carried on exactly in accordance with the regulations formulated by the International Polar Commission. Hydrographical and magnetic studies have also been pursued on the ice in the Ice Fjord, as well as parallax measurements of clouds, and observations as to the temperature of the air, the snow, and the earth. The winter has on the whole been mild; the greatest cold occurring on January 2, when the thermometer registered 35.5° C. below freezing point. Storms have been few. Since September last the following buildings have been erected:—A hut on a mountain at an elevation of 270 metres, containing the anemometer and the wind-fan, which were read by a self-registering electrical apparatus; two astronomical observatories; another magnetic hut; a bath-house, a forge, and a wood storehouse. The dwelling house and working room have also been enlarged. The following game was shot during the winter: 61 ptarmigans, 9 reindeer, 18 wild geese, 20 foxes, and some wild fowl. With continuous labour, plenty of food and drink, and frequent baths, the members of the expedition have throughout enjoyed excellent health. Descriptions of the nature, our labour and life here during the wintering will follow."

AT the meeting of the Scottish Meteorological Society held on Thursday last week it was announced that upwards of 4500*l.* had been already subscribed to establish the Meteorological Observatory on the top of Ben Nevis. The subscriptions vary in amount from 200*l.* to one penny, and the subscribers include Her Majesty the Queen and all classes of her subjects, and town councils and other corporate bodies in all parts of the United Kingdom. The road to the top of Ben Nevis is nearly half finished. The building will be commenced early this month, and it is contemplated that the portion to be completed this season will be ready at the end of October for the three observers, who will begin their regular observations on November 1.

MR. MUNDELLA in presenting his educational budget the other night had nothing but essential progress to report. The cry of overworking the children was introduced by some of the speakers, but Sir John Lubbock pointed out that monotony and not overwork was the real weakness of the present system, and that the tendency was to cultivate the memory at the expense of the observing faculty. The real remedy, as he pointed out, is to introduce greater variety into the elementary course, and above all to make practical science teaching an essential part of the curriculum.

FROM a statement issued with reference to the Rolleston Memorial we learn that the total sum subscribed is 1183*l.* 5*s.* 0*d.*, to which is added 59*l.* 7*s.* 5*d.*, dividends paid on sums invested from time to time in Consols before the list was closed. From this total have been deducted secretaries' expenses, charges for printing, advertising, &c., 36*l.* 16*s.* 9*d.*, leaving a capital sum of 1205*l.* 15*s.* 8*d.* invested in 1200*l.* Three per Cent. Consols. This sum has now been transferred to the chancellor, masters, and scholars of the University of Oxford, and accepted by them as the Rolleston Memorial Fund. The fund, it has been decided, will be expended in the institution of a prize to be awarded every two years for original research in any subject comprised under the following heads:—Animal and Vegetable Morphology, Physiology and Pathology, and Anthropology, to be selected by

the candidates themselves. The period during which this prize may be obtained by a candidate is limited to ten years after the date of matriculation; and with a view to render the prize as widely associated with Prof. Rolleston's name as possible, it is open to the members of the Universities of Oxford and Cambridge.

A CORRESPONDENT writes to us that he has received from a resident at Zagazig, in Egypt, a curious fact concerning cholera, which, if not noticed before, may be of interest. The resident stated that the town of Zagazig was perfectly healthy, and that the swallows and sparrows were flying about as usual, and so long as they remained he considered they were quite secure from any attack, but when they left he would not be long before he followed them. He remarked further that the birds had been observed by old hands to depart before the approach of cholera during the last four epidemics. Our correspondent asks what can be the cause of this, and we shall be glad if any of our readers can answer the question.

A CORRESPONDENT makes the following statement:—"Kentish men who drink chalk water are large boned, whilst those people who drink soft water are the reverse. At Glasgow, where the water is supposed to be very soft, there are said to be more bandy-legged children than at any other place." Is this so?

M. PASTEUR has written to the *Voltaire* a letter justifying the step taken by him in advising the Government to send a mission to Egypt in order to study the generation of cholera. He believes that this plague is produced by some description of microzyme; but he admits that this minute organism has not been discovered yet.

M. BARTHÉLEMY ST. HILAIRE has just finished the printing of his translation of the "Natural History of Animals," by Aristotle, which will be published in a very few days; it consists of four large octavo volumes.

THE managing committee of the Vienna International Electric Exhibition, which recently announced that, in consequence of the delay in the arrival of exhibits, the opening of the Exhibition, originally arranged for the 1st inst., would have to be postponed, has now fixed the ceremony for the 16th.

THE International Medical Congress of the present year will open at Amsterdam on September 4, and will be attended by a number of the most distinguished physicians and medical men of Great Britain, France, Belgium, and Germany. Amongst the British physicians papers or addresses have been promised by Sir Joseph Fayrer, M.D., and Dr. J. Ewart, on the treatment of imported and tropical diseases in countries belonging to the temperate zone; Dr. F. de Chaumont, of Netley Hospital, on the best measures of quarantine; Dr. E. Waring, of London, on the remedies used by the natives of tropical countries against the most dangerous epidemics; Dr. J. B. Scriven, on quinine injections and malaria fevers; Dr. Norman Chevers, late Professor at Calcutta, on tropical epidemics and the influence of tropical climates upon them; and Dr. Dyce Duckworth, of London, on the education of physicians for the Colonies.

THE fifty-first meeting of the British Medical Association began on Tuesday at Liverpool with the address of the President (Dr. A. T. H. Waters of Liverpool). On Wednesday the Council met to consider invitations for 1884 and to nominate a President Elect.

THE Gardens of the Zoological Society of Philadelphia in Fairmount Park are, we believe, the most nearly complete and best organised Zoological Gardens on the American Continent. Their eleventh annual report, now before us, shows a consider-

able amount of progress since their last anniversary. The number of visitors to the Gardens in the twelve months ending on the last day of February 1883 was 252,866, being nearly 10,000 more than in the preceding corresponding months. The income of the Society during the same period was rather over \$50,000, while the expenditure seems to have been some \$8000 less. During the same twelve months 423 living specimens were added to the collection, the total number of animals in the gardens at the date of the report being estimated at 687, of which 306 were Mammals, 338 Birds, and 43 Reptiles and Batrachians. These figures, no doubt, cannot rival those of the Zoological Society of London. But it must be recollected that our Society has been founded upwards of fifty years, is supported by some 3300 members, and has a population of 4,000,000 to draw upon for its visitors, not to count the strangers who are perpetually seeing the "sights of London." Among the special additions to the menagerie to which attention is invited in the report is an example of the Coast Fox (*Vulpes littoralis*) received from Yucatan, and stated to be probably the first to be exhibited in a living state. This rare fox has, we believe, never been obtained by the Zoological Society of London, and we rather doubt whether there is any example of it in the British Museum.

THE Committee of the Sunday Society have resolved to petition the Prince of Wales to use his influence as President to have the Fisheries Exhibition open to the public on a few Sundays before the final close of the collection.

AMONG a number of very munificent bequests that have been left to Paisley by the late Mr. Brough, we, says the *British Medical Journal*, observe that he has directed that 300*l.* is to be spent annually in establishing and maintaining a science lectureship in that town, with all the necessary adjuncts and accessories. The subjects to be taught are left to the trustees to fix, but the testator himself recommends that one of them should be physiology.

A VIOLENT shock of earthquake was felt at Catanzaro, in Calabria, on the morning of July 25.

WITH reference to the volcanic eruption on Krakatan Island off the coast of Java, brief reports of which were received by telegraph, and then noticed in *NATURE*, the following particulars have since been received. During Sunday, May 20, and Monday, May 21, the eruption was very heavily felt at Batavia, also more or less on Tuesday, May 22; but the earthquake shocks have since ceased, although the mountain is still apparently vomiting fire and smoke. The following report is from Anjer, dated May 23, 3.47 a.m.:—"On Sunday morning last, from six to ten o'clock, there was a tremendous eruption, with continuous earthquakes and heavy rain of ashes. On Sunday evening and Monday morning it was continued. The eruption was distinctly seen here till nine o'clock this morning, and smoke was seen until twelve o'clock; afterwards it cleared up a little, and at this moment the air is clouded again. Capt. Ross reports from Anjer that on May 22 he was sailing near Java's first point and tried to get Prinsen Island in sight, but found that it was surrounded by clouds. Then he steered for Krakatan, but found it to be the same there. The captain observed that the lower island or mountain situated on the north side of Krakatan was totally surrounded by smoke, and from time to time flames arose with loud reports. Fire had broken out in several places, and it is very likely that the trees in the neighbourhood have caught fire. The mountain of Krakatan has been covered all over on the north side with ashes. The captain could not make out the condition of the mountain, as he kept away as far as possible, being afraid of the wind falling, and the vessel being drifted on to the island. The strongest fire was seen on the evening of May 22, with heavy explosions and detonations. The fire was also seen at that time at Anjer, but on account of the heavy smoke nothing could be perceived, as

all the islands remained clouded. The captain did not experience any shower of ashes. The master of the steamer *Conrad*, which arrived at Batavia on May 24, reports having passed Krakatan on the north side the previous night, and met with heavy rains of ashes, covering the decks, &c., with about $1\frac{1}{2}$ inch of ashes. He also had to cut his way through nearly $1\frac{1}{2}$ metres of pumice-stone, which occasioned a delay of almost five hours.

WE have already referred in NATURE to the excellent scientific work being done by the French in the Indo-Chinese peninsula, as evinced by the large number of scientific missions which have been despatched from France to those regions. As a farther example of the pains taken in France to obtain a thorough knowledge of the country in which she seems destined to play so large a part, we may refer to a periodical published by the Government of Saigon, entitled *Cochin-chine Française: Excursions et Reconnaissances*. The fifteenth part is now before us, and as each part contains about two hundred pages the amount of information accumulated in these volumes is considerable. Speaking broadly, and slightly altering a well-known Latin maxim, it may be said that nothing relating to the vast territory between the mouths of the Brahmaputra and the Canton river, between the Bay of Bengal and the China Sea, is outside the scope of this journal. As a rule the papers are of a highly scholarly and scientific kind. Thus the last number contains the second part of a long and richly illustrated paper on the coins and medals of Annam and French Cochinchina, by M. Silvestre, inspector of native affairs in Saigon; a short history of the Portuguese in Cambodia; an account of the typhoon of last November at Hué, the capital of Annam, with barometrical tables, by the surgeon to the French Legation there; a long paper on the vegetation and forest administration of British Burmah; and finally one of a series of very interesting papers on the customs and popular superstitions of the Annamites. The present instalment deals with marriage customs. The efforts of the Colonial Government to sustain and encourage the study of Indo-China does not, however, close with the publication of this excellent journal, for we observe the advertisements of a large number of works relating to that country in the magazine under review. Among these are a weekly journal for the natives, an annual summary of facts relating to Cochin China, various maps, medical reports, &c. Whatever may be thought from other points of view of the action of France in Annam and Tonkin, there can be no doubt that the increase of French power there carries with it a large increase to knowledge, for the Colonial Government of France appears to know how to organise and stimulate research in the countries over which it exercises rule.

THE telegraph has made another step in advance in China. It has had the honour of being mentioned in a memorial to the throne. Li Hung Chang recently mentioned in a report to the Emperor that he received certain information by telegraph. And, more wonderful still, that mysterious and awe-inspiring document, an Imperial decree, written with the vermilion pencil, has actually been despatched by telegraph, for the Viceroy of Canton reports recently in a memorial that a decree had been conveyed to him in this way.

THE German system of *privat docenten*, or University teaching by outsiders, is to be tried in France. A decree provides that any doctor of letters or sciences, or correspondent or member of the Institute, may apply to the Minister of Education for permission to lecture on his respective subject, the license being renewable annually. The lectures may be public or private, at the professor's option, and the expense falls on him, while he can charge the students what he pleases. The same system is applied to the medical school.

WE have received the *Transactions of the Norfolk and Norwich Naturalists' Society* for 1882-83. In the first paper, on the scenery of Norfolk, Mr. Horace Woodward gives a history of the geological strata of the county, shows how the scenery was influenced by the action of water and the introduction of various forms of life, and how affected by the artificial changes brought about by man. There is also an interesting paper by Mr. Stevenson on the dusky petrel, and a paper by Mr. Southwell on the bottle-nosed whale and the history of the seal fishery. Mr. Clement Reed's paper on the discovery of Lithoglyphus in the Weybourn Crag is very interesting, from the fact that this freshwater shell is found now in Europe only in the Danube. Mr. Young gives his observations on the habits of the bearded tit, which birds he had kept in confinement for twelve years. Mr. Bidwell's list of British birds in whose nest the egg of the cuckoo has been found is the most complete yet published. The President contributes part x. of the fauna and flora of Norfolk, a list of the marine algae.

THE exhibition of the Society of Agriculture and Insectology of Paris has just come to an end with a ministerial visit and distribution of prizes at the Palais de l'Industrie. Thousands of visitors have flocked to this hall in order to visit the interesting collection. A special building will be erected for the Society in the Park de Montsouris, and a sum of 32,000 francs has been already voted for this purpose by the city of Paris. A menagerie of living insects is to be established.

ACCORDING to the Austrian *Monatschrift für den Orient* the production of tin in the protected state of Perak, in the Malay Peninsula, for the year 1882 was 7000 tons, about equivalent to that of Cornwall. Forty thousand Chinese are employed in the Malacca tin mines.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus* ♂) from India, presented by Mr. J. W. Lucking; a White-throated Capuchin (*Cebus hypoleucus* ♂) from Central America, presented by Mr. F. Hoëy; a Leopard (*Felis pardus*) from Somali Land, East Africa, presented by Mr. Frederick Holmwood; four Babiroussas (*Babirussa alfurus* ♂ ♂ ♀ ♀) from Celebes, presented by Dr. F. H. Bauer, C.M.Z.S.; a Two-spotted Paradoxure (*Nandinia binotata* ♂), a Royal Python (*Python regius*) from West Africa, presented by Dr. D. Hume Hart; two Short-headed Phalangiers (*Belideus brevicaeps* ♂ ♀), two Crested Pigeons (*Ocyphaps lophotes* ♂ ♀), a Modest Grass Finch (*Amadina modesta*) from Australia, two Bichenos's Finches (*Estrelida bichenovii*) from Queensland, a Funereal Cockatoo (*Calyptorhynchus funereus*) from New South Wales, a Saisset's Parrakeet (*Cyanorhamphus saisseti*) from New Caledonia, a New Zealand Parrakeet (*Cyanorhamphus nove-zealandie*) from New Zealand, presented by Mr. T. H. Bowyer Bower, F.Z.S.; an Australian Cassowary (*Casuarus australis*) from Australia, presented by Capt. Mann; four Black Guillemots (*Uria grylle*) from Ireland, presented by Mr. H. Becher; a South American Rat Snake (*Spilotes variabilis*) from Brazil, presented by Mr. C. A. Craven, C.M.Z.S.; two Peacock Pheasants (*Polyplectron chinquis* ♂ ♂) from British Burmah, deposited.

WEATHER PROGNOSTICS AND WEATHER TYPES¹

THE object of the first paper was to explain the best known popular prognostics by means of the most recent discoveries in meteorological science.

A great advance has been made in meteorology during the last twenty years owing to the introduction of daily synoptic charts of the distribution of atmospheric pressure, temperature,

¹ Abstract of two papers read before the Meteorological Society: "On Weather Prognostics," by Hon. Ralph Abercomby and W. Marriott; "On certain Types of British Weather," by Hon. R. Abercomby. (*Quarterly Journal of the Meteorological Society*, vol. ix. No. 45.)